REMARKS

Claims 1-23 are pending in the application. Claims 1-23 stand rejected. Claims 1, 2 and 10 have been amended. In view of the amendments to the claims and the remarks below, Applicants respectfully request that the rejections be withdrawn and that the claims be allowed.

Claims 1, 2, 5, 9-14, 16, 22 and 23 stand rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 5,894,125 to Brener et al. ("Brener"). The rejection is respectfully traversed.

Claim 1 recites a terahertz radiation source which includes "an emitter comprising a semiconductor material having two sides; a pair of electrodes on one side of said semiconductor; a pulsed light source input for illuminating said semiconductor to excite photocarriers in said semiconductor to generate terahertz radiation; and a radiation collector to collect said terahertz radiation." The radiation collector "is disposed on the same side of said semiconductor as said electrodes." Additionally, the light pulsed source "impinges on the same side of said semiconductor as said electrodes." As explained below, Brener fails to disclose all of the elements and limitations recited by claim 1.

Brener discloses two types of terahertz imaging systems. As prior art, Brener discloses a terahertz imaging system that includes a semiconductor substrate 11 with strip electrodes 12 and 13 on one side of the semiconductor substrate 11. Brener, fig. 1. A laser from a pump laser is incident on a gap 17 between the electrodes 12, 13. "In the usual pump arrangement described in the prior art the pump beam is incident on the top surface of the semiconductor (as it appears in FIG. 1). The generated THz signal radiates in all directions but a large fraction is emitted into the substrate 11 and is collected from the backside of the substrate." Brener, col. 3, ll. 55-60. Thus, the prior art disclosed by Brener does not anticipate claim 1 because claim 1 recites that the electrodes and the radiation collector are on the same side of the semiconductor as where the light pulsed source impinges.

Brener also discloses a terahertz imaging system that includes a semiconductor substrate 21, electrodes 23, 24, and a laser pump radiation beam 26. Brener, fig. 2. The laser pump radiation beam is incident on the semiconductor side that is opposite the side that includes the electrodes. *Id.* Thus, this disclosure of Brener fails to anticipate claim 1 for at least the reason that the laser pump radiation beam impinges on a side of the semiconductor that is not the same side on which the electrodes are located.

Additionally, the Office Action states that Brener discloses a radiation collector in the form of a sample 28 and sample holder 29. Office Action, p. 2. However, there is no evidence or description in Brener that the sample and sample holder are designed to collect radiation. The fact that terahertz radiation is incident on the sample does not make the sample a radiation collector – there does not appear to be any disclosure that the sample acts to collect the terahertz radiation.

For at least these reasons, Brener fails to anticipate claim 1 and claim 1 is allowable over Brener. Claims 5 and 9 depend from claim 1 and are allowable for at least the same reasons that claim 1 is allowable.

Claim 2 recites a terahertz radiation source which includes "a semiconductor having opposed first and second faces; a pair of electrodes adjacent to one of said faces of said semiconductor; a pulsed light source input for illuminating said one of said faces of said semiconductor to excite photocarriers in said semiconductor to generate terahertz radiation; and a radiation collector to collect said terahertz radiation." The radiation collector "is configured to collect said terahertz radiation from said one of said faces of said semiconductor without said collected radiation having passed through the other of said faces." As explained above, Brener fails to disclose all of the elements and limitations recited by claim 2. Specifically, Brener does not disclose a terahertz imaging system with a semiconductor that includes electrodes adjacent to one face of the semiconductor, a pulsed light source for illuminating the same face of the semiconductor, and a radiation collector "configured to collect said terahertz radiation from said one of said faces of said semiconductor without said collected radiation having passed through the other of said faces." For at least this reason, claim 2 is allowable over Brener.

Claim 10 recites a source of terahertz radiation that includes a semiconductor "bearing a pair of electrodes adjacent one surface of said semiconductor; means for directing a pulsed laser onto said electrode-bearing semiconductor surface to generate terahertz radiation; and means for providing said terahertz radiation from said source." The "providing means is disposed to face said electrode-bearing semiconductor surface." As explained above, Brener fails to disclose all of the elements and limitations recited by claim 10. Specifically, Brener does not disclose a terahertz imaging system with a semiconductor that includes electrodes adjacent to one surface of the semiconductor, means for directing a pulsed laser onto the electrode-bearing semiconductor surface, and a providing means "disposed to face said electrode-bearing semiconductor surface." For at least this reason, claim 10 is allowable over Brener. Claims 11-14 and 16 depend from claim 10 and are allowable for at least the same reasons that claim 10 is allowable.

Claim 22 recites a method of providing terahertz radiation from a source that comprises a semiconductor with electrodes adjacent an excitation surface of the semiconductor. The method includes "directing a pulsed laser beam towards said excitation surface; and using terahertz radiation emitted out of said excitation surface for providing said terahertz radiation." In the method of claim 22, the electrodes are adjacent the excitation surface, the pulsed laser beam is directed towards the same excitation surface, and the terahertz radiation used is emitted from the same excitation surface. This is different from Brenner which discloses a first system wherein the laser beam is directed towards the same semiconductor side that the electrodes are on, but wherein the used terahertz radiation is emitted from an opposite side, and a second system wherein the laser beam is directed towards a semiconductor side that is opposite the side adjacent to the electrodes and from which the used radiation is emitted. In either case, Brener fails to anticipate claim 22. Claim 22 is thus allowable over Brener.

Claim 23 recites a method of providing terahertz radiation from a source that comprises a semiconductor with electrodes adjacent a surface of the semiconductor. The method includes "directing a pulsed laser beam towards said semiconductor surface," the beam being directed with a component in a forward direction normal to said semiconductor. The method also includes "collecting said terahertz radiation in a reverse direction, substantially opposite to said forwards

direction." As explained in relation to claim 22, Brener simply does not disclose a terahertz system wherein the electrodes are on the same side of a semiconductor surface to which the pulsed laser beam is directed and from which terahertz radiation is emitted. For at least these reasons, claim 23 is allowable over Brener.

Because Brener fails to disclose each element and limitation of claims 1, 2, 5, 9-14, 16, 22 and 23, these claims are allowable over Brener. Applicants respectfully request that the rejection be withdrawn and that the claims be allwed.

Claims 3, 4, 6-8, 15 and 17-21 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Brener. The rejection is respectfully traversed.

Claims 3, 4, 6-8, 20 and 21 depend from claim 1. Because claim 1 is allowable over Brener, as discussed above, claims 3, 4, 6-8, 20 and 21 are also allowable over Brener for at least the same reasons that claim 1 is allowable. Similarly, claim 15 depends from claim 10 which is allowable over Brener, as discussed above. Therefore, claim 15 is also allowable over Brener for at least the same reasons that claim 10 is allowable.

Claim 17 recites a terahertz emitter. The emitter includes "a semiconductor having first and second electrodes adjacent a first face of said semiconductor." The first and second electrodes define "a gap therebetween." The emitter also includes "a heat transfer device mounted adjacent a second face of said semiconductor substantially opposite said first face; and wherein at least a portion of said heat transfer device is disposed substantially opposite said gap." Brener fails to teach or suggest at least these elements and limitations of claim 17, as discussed below.

The Office Action states that although Brener does not "explicitly disclose using a heat transfer device mounted adjacent to the semiconductor ..., [i]t would have been obvious to one of ordinary skill in the art at the time the invention was made to use cooling devices." Office Action, p. 5. However, using a heat transfer device with at least a portion of the device disposed substantially opposite the electrode gap would be impossible with the teachings of Brener. Both the prior art identified by Brener and the embodiments disclosed by Brener require that either a laser

beam or terahertz radiation pass through the semiconductor, either entering or exiting the semiconductor at a point substantially opposite the electrode gap. *See, e.g.*, Brener, fig. 4; col. 3, ll. 40-67. A heat transfer device disposed in this position would significantly interfere with the function of the terahertz imaging systems disclosed by Brener. Thus, Brener cannot teach or suggest each of the elements and limitations of claim 17. Claim 17 is therefore allowable over Brener. Claims 18 and 19 depend from claim 17 and are also allowable for at least the same reasons that claim 17 is allowable.

Because claims 3, 4, 6-8, 15 and 17-21 are allowable over Brener, Applicants respectfully request that the rejection be withdrawn and that the claims be allowed.

In view of the above amendment, Applicants believe the pending application is in condition for allowance.

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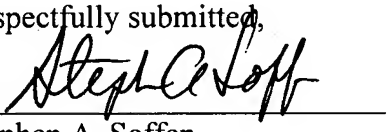
Respectfully submitted,

By 

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